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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/708,508	03/09/2004	Arup Gangopadhyay	81071965 FMC 1614 PUS	2507
28395	7590	02/23/2006	EXAMINER	
BROOKS KUSHMAN P.C./FGTL 1000 TOWN CENTER 22ND FLOOR SOUTHFIELD, MI 48075-1238			LE, DAVID D	
			ART UNIT	PAPER NUMBER
			3681	

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>		<b>Applicant(s)</b>	
	10/708,508		GANGOPADHYAY ET AL.	
	<b>Examiner</b>		<b>Art Unit</b>	
	David D. Le		3681	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 November 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### **DETAILED ACTION**

1. This is the second Office action on the merits of Application No. 10/708,508, filed on 09 March 2004. Claims 1 and 3-6 are pending.

### **Documents**

2. The following documents have been received and filed as part of the patent application:
  - Information Disclosure Statement, received on 03/09/04
  - Information Disclosure Statement, received on 03/26/04

### ***Specification***

3. The disclosure is objected to because of the following informalities:
  - Paragraph [0007], lines 10-11 recite “an average surface roughness of 4-7 microinches” without providing the equivalent metric unit(s);
  - Paragraph [0019], lines 2-3 recite “an average centerline roughness of 4-7 microinches” without providing the equivalent metric unit(s);
  - Paragraph [0024], lines 4-6 recite “the supper-finish provides about 0.13 more miles per gallon, which translates to a 0.45% gas mileage improvement in FTP metro/highway cycles” without providing the equivalent metric unit(s). See MPEP 608.01.

Appropriate correction is required.

*Claim Objections*

4. Claims 1, 3 and 5 are objected to because of the following informalities:
- Claim 1, line 8 recites “an average surface roughness of 4-7 microinches” without providing the equivalent metric unit(s);
  - Claim 3 recites “wherein the super-finished surfaces improve the fuel efficiency of the vehicle by 0.45% miles per gallon in FTP metro/highway cycles.” The present claimed recitation does not provide the equivalent metric unit(s) for the claimed 0.45% miles per gallon; and
  - Claim 5, line 11 recites “an average surface roughness of 4-7 microinches” without providing the equivalent metric unit(s). See MPEP 608.01.

Appropriate correction is required.

*Claim Rejections - 35 USC § 103*

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. **Claims 1 and 3-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Japanese Patent No JP 63007221 (JP'221) in view of U. S. Patent Application Publication No. US 2002/0088773 to Holland et al. and further in view of U. S. Patent No. 6,732,606 to Zhu et al.**

Claims 1 and 3-6:

**JP'221** (i.e., Figs. 3-4 and the abstract) discloses a differential gear set comprising:

- A pinion gear (1) connected to a drive shaft (i.e., Fig. 3);
- Wherein the pinion gear includes a plurality of teeth (i.e., Fig. 3);
- A ring gear (2) connected to the rear axle (7) and having a plurality of teeth that are engaged by the teeth of the pinion gear (i.e., Fig. 3); and
- Wherein the gears and their teeth are subjected to a gear surface treating, resulting in low surface roughness of the gear (i.e., abstract).

**JP'221**, abstract, lacks wherein the surface finish has an average roughness of 4-7 microinches.

**Holland** (i.e., paragraphs [0020] to [0025]), on the other hand, teaches a gear surface being super-finished by the superfinished process utilizing a bowl containing ceramic media and acid solution; wherein the superfinished gears, as taught by Holland, inherently provide low surface roughness and improve fuel efficiency.

Since Holland does not disclose/mention a break-in coating, Examiner assumes the superfinished gears are not provided with a break-in coating.

**Zhu** (i.e., column 4, lines 11-12), however, teaches an optimally finished gear having a surface roughness of 5-10 microinches.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify JP'221 such that the gear surface treating is the gear surface superfinished process, in view of Holland, in order to improve the performance as well as the life span of the gears (see Holland, paragraphs [0001] to [0002]); and to further modify JP'221 such that the surfaces of the treated gears include a surface roughness of 5-10 microinches, in view of Zhu, in order to further improve the gear performance (see Zhu, column 2, lines 13-48).

Note:

It should be noted that the method/process of super-finishing the gear surface is not germane to the issue of patentability of the gear itself. Therefore, these limitations have not been given patentable weight.

***Response to Arguments***

7. Applicant's arguments filed on 30 November 2005 have been fully considered but they are not persuasive.

Applicants argue the applied references do not disclose or suggest a solution to the problem discovered by Applicants that by providing a pinion gear and ring gear of a gear set for

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a vehicle with teeth that are super-finished to an average surface roughness of 4-7 microinches can lead to improved fuel efficiency of 0.45% in relevant test cycles.

Examiner respectfully disagrees because Zhu'606 reference (i.e., column 2, lines 13-17) states, "a gear having a surface finish between approximately 5 micro-inches to approximately 10 micro-inches Ra for improved contact fatigue life, improved wear resistance, reduced friction and improved gear performance." Clearly, one of ordinary skill in the art would have recognized, based on the teaching of Zhu'606 that a gear having a surface roughness between 5-10 micro-inches, which reduces friction, could lead to achieving a greater improvement in fuel efficiency of the vehicle.

Accordingly, as set forth in paragraph 6 above, the applied references meet the claimed limitations.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David D. Le whose telephone number is 571-272-7092. The examiner can normally be reached on Mon-Fri (0700-1530).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles A. Marmor can be reached on 571-272-7095. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
ddl

  
CHARLES A. MARMOR  
SUPERVISORY PATENT EXAMINER  
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